

## CHAPTER 6 UXO SUPPORT DURING CONSTRUCTION ACTIVITIES

### 6-1. Introduction.

a. This chapter discusses procedures for UXO support during construction activities (including construction activities related to remedial actions) on sites with known or suspected UXO. The purpose of UXO support during construction activities is to reduce the potential for exposure to UXO.

b. UXO support during construction activities may require only UXO safety support or a complete UXO subsurface clearance response, depending on an assessment of the probability of encountering UXO and the level of confidence associated with the determination.

(1) If the probability of encountering UXO is low (e.g., current or previous land use leads to an initial determination that UXO may be present), only UXO safety support will be required. UXO safety support is discussed in paragraph 6-5.

(2) When a determination is made that the probability of encountering UXO is moderate to high (e.g., current or previous land use leads to a determination that OE was employed or disposed of in the area of concern), UXO qualified personnel must conduct a subsurface clearance of the known construction footprint and remove all discovered UXO.

(3) The level of effort for construction support is site/task-specific and will be determined on a case-by-case basis by the project team in coordination with the OE MCX.

c. When a determination is made that the probability of encountering UXO on a construction site is moderate to high (i.e., a subsurface clearance of the known construction footprint will be conducted), an OE Safety Specialist will be on-site to provide safety oversight. When a determination is made that the probability of encountering UXO on a construction site is low, (i.e., only UXO safety support is required), an OE Safety Specialist is generally not required on-site. Additional details are available in ER 1110-1-8153.

### 6-2. UXO Team Composition.

a. General. For construction activities on sites with known or suspected UXO, the contractor will provide a UXO team consisting of a minimum of two qualified UXO personnel (one UXO Technician III and one UXO Technician II). The UXO team may include additional UXO qualified personnel, depending on site and task specific conditions/requirements. The number of UXO teams will vary depending upon the total level of effort. A description of the qualifications for contractor UXO personnel is provided on the OE MCX website at <http://www.hnd.usace.army.mil/oww>.

b. If subsurface clearance is required in support of construction activities (i.e., there is a moderate to high probability of encountering UXO), the UXO team(s) must also meet the following standards:

(1) Each UXO team will not include more than six team members in addition to the UXO Technician III.

(2) A Senior UXO Supervisor (SUXOS) will be on-site and will not supervise more than 10 UXO Technician IIIs. There will not be more than one SUXOS per project without prior approval from the Contracting Officer.

(3) The position of UXOSO will be required on all subsurface clearance projects in support of construction activities; however, the positions of UXOSO and UXOQCS may be dual-hatted when there are less than 15 personnel on site.

(4) A UXOQCS may not be required full-time on-site. However, quality control functions will be performed for all field activities.

6-3. Responsibilities. The UXO team members have the following responsibilities for UXO support during construction on a site with known or suspected UXO:

a. Prepare a Work Plan and ESS (if required) to supplement the prime contractor's or USACE Work Plan/site plan as described in Chapter 3.

b. Provide the explosive ordnance recognition, location, and safety functions for the prime contractor during HTRW sampling activities.

c. Conduct UXO safety briefings for all site personnel and visitors.

6-4. Authority. The OE Safety Specialist has final on-site authority on OE safety matters. If an OE Safety Specialist is not present on-site, the UXO supervisor has final on-site authority for OE matters.

6-5. Safety Support.

a. Safety support is required for construction activities on sites with known or suspected UXO if the probability of encountering UXO is low.

b. The UXO team should review any archival information available regarding the area of the proposed construction activities. If possible, the UXO team should determine the probable types of UXO that may be encountered and specific safety considerations. The UXO team should meet with on-site management and construction personnel and conduct a general work and safety briefing, including:

- (1) Probable site hazards and site-specific safety considerations.
- (2) UXO safety support procedures.
- (3) Responsibilities and lines of authority for any UXO-related response.
- (4) Emergency response procedures.

c. The UXO team should physically preview the actual construction footprint with the on-site management of the construction contractor and discuss visual observations and potential areas of concern. In the event surface UXO is discovered, the UXO team will place flagging adjacent to the discovery for subsequent visual reference, select a course around the item, and lead any on-site personnel out of the area. The UXO team will assess the condition of the UXO to determine if disposal action is required.

d. The UXO team should monitor all excavation activities in areas potentially contaminated with UXO. One member of the team should be positioned to the rear and upwind of the excavation equipment for continuous visual observation of activities. If the construction contractor unearths or otherwise encounters suspect UXO, all excavation activities will cease. The UXO team will assess the condition of the UXO to determine if disposal action is required. Once UXO has been encountered in an excavation, no further excavation is allowed at that location until EOD has removed the UXO item. Once the item is removed, excavation may continue. The After Action Report will indicate that UXO was encountered and will summarize resulting activities.

e. The UXO team is generally not tasked to perform UXO/OE disposition activities during safety support of construction activities. If UXO is encountered that requires disposal, the procedures outlined in paragraph 5-12 of this pamphlet will be followed.

#### 6-6. Subsurface Clearance in Support of Construction Activities.

a. A subsurface clearance of the identified construction footprint is required when the probability of encountering UXO during construction-related excavation activities is moderate to high.

b. The subsurface clearance process requires close coordination among on-site management personnel of the USACE, construction contractor, and UXO contractor. The UXO team should physically preview the actual construction footprint with other on-site management personnel and discuss visual observations and potential areas of concern.

c. A surface clearance may be required to remove any existing UXO from the surface of the work area prior to proceeding with subsurface clearance activities. All UXO-related remnants, target materials, and non-UXO related materials which may interfere with a subsurface

geophysical survey should also be removed from the surface of the work area and staged for later disposition. Surface clearance activities will be performed by the UXO team.

d. Safety Considerations.

(1) Subsurface clearance actions must be accomplished in strict accordance with the accepted Work Plan, SSHP, ESP, and ESS (if required). The UXO team should review any archival information available regarding the area of the proposed construction activities and, if possible, determine the probable types of UXO that may be encountered and specific safety considerations. Prior to commencing subsurface clearance activities, the UXO team should provide a general work and safety briefing to all on-site personnel. This briefing should address the following:

- (a) Probable site hazards and site-specific safety considerations.
- (b) UXO safety support procedures.
- (c) Responsibilities and lines of authority for any UXO-related response.
- (d) Emergency response procedures.

(2) Underground Utilities. Utility clearance and/or excavation permits, if required, must be obtained prior to the commencement of any intrusive activities. The UXO team is responsible for verifying that all necessary excavation permits are on-site prior to commencing operations. The prime contractor is responsible for contacting the appropriate agency(ies) or company(ies) to mark the location of all subsurface utilities in the construction area. All located utilities should be marked by paint, pin flags, or other appropriate means to visually delineate their approximate subsurface routing. The color shall not conflict with the colors used in UXO activities. In the event subsurface utilities are suspected in an excavation area, the UXO team must attempt to verify their location. The UXO team should be aware that not all utility lines will be detectable with geophysical equipment (i.e., not all utility lines are constructed of ferrous material).

(3) Exclusion Zones. Exclusion zones must be established in accordance with Chapter 3 for all UXO clearance procedures (i.e., anomaly excavation, access and identification of UXO, UXO recovery, and UXO/OE destruction). During these operations, personnel not directly involved in the specific UXO subsurface clearance task will withdraw to a location outside the exclusion zone.

e. Area Preparation.

(1) Area preparation includes reduction and/or removal of vegetation that may impede or limit the effectiveness of subsurface clearance actions. Vegetation reduction/removal may be accomplished through manual removal, mechanical removal, controlled burning, or defoliation.

Selection of the appropriate land clearing strategy should be based on the type and concentration of vegetation, topography, drainage patterns, terrain and soil conditions, and the level of required environmental and natural resource protection.

(2) Area preparation is not considered a UXO clearance procedure. The UXO escort and anomaly avoidance procedures for access surveys presented in paragraph 5-5 of this pamphlet should be followed.

f. Geophysical Mapping/Analysis.

(1) A subsurface geophysical survey will be conducted to identify and locate all anomalies in the identified construction footprint. The various types of geophysical detection equipment are presented in Chapter 4. Subsurface geophysical surveys may be completed using detection instrumentation with real time or post-processing identification and discrimination techniques. All anomalies should be prominently marked with survey flagging or pin flags for subsequent intrusive investigation.

(2) Subsurface geophysical surveys are not considered a UXO clearance procedure. The UXO escort and anomaly avoidance procedures for access surveys presented in paragraph 5-5 of this pamphlet should be followed.

g. Anomaly Excavation.

(1) Anomaly excavation operations are required to intrusively investigate and identify the source of all anomalies located during completion of the subsurface geophysical survey. During excavation operations, only essential project personnel should be within the exclusion zone. All anomaly excavation operations will comply with the provisions of 29 CFR 1926, Subpart P.

(2) Normally, UXO qualified personnel will manually complete anomaly excavations of less than one foot. If an anomaly is deeper than one foot, earth-moving machinery (EMM) should be used to assist in excavation efforts unless site constraints or accessibility restrict or prohibit use. EMM will not be used to excavate within 12 inches of an anomaly. When an anomaly excavation gets within approximately 12 inches of an anomaly, manual excavation must be used to complete the excavation.

(3) Only UXO qualified members of a UXO team may conduct manual excavation operations. A non-UXO qualified member of the UXO team may operate EMM used to assist in anomaly excavations. If more than one EMM will be used within the same work area, the team separation distances described in Chapter 3 will apply to the EMMs.

(4) After the probable source of the anomaly is identified and removed, an approved geophysical instrument should be used to validate the process. If the geophysical instrument

does not continue to detect an anomaly, then the excavation may be back-filled and restored in accordance with contract requirements.

6-7. UXO Destruction.

a. The Work Plan should include procedures for destruction of UXO recovered during construction activities. Destruction of recovered UXO can take one of three forms: in-place, on-site, and off-site. The decision regarding which technique to use is based on the risk involved in employing the disposal operation based on site-specific characteristics and the nature of the UXO recovered as determined by the UXO team. Additional information on UXO disposal operations can be found in TM 60A-1-1-31, Explosive Ordnance Disposal Procedures.

(1) In-Place Destruction. In-place destruction (blow-in-place) is a technique used when a UXO item cannot be safely moved to an alternate location for destruction. This technique is preferred because it exposes the minimum number of personnel. All in-place destructions will be conducted in a manner that ensures maximum control of the site. When this technique is employed, engineering controls are often used to minimize the blast effects.

(2) On-Site Destruction. If UXO is recovered in close proximity to occupied buildings, it may not be possible to safely destroy the item in place. In this instance, the item may be moved to a remote part of the project site where destruction and disposal can safely take place. When a UXO item is destroyed on-site, engineering controls are often used to minimize the blast effect. Guidance for the on-site destruction of UXO is found in EP 1110-1-17.

(3) Off-Site Destruction. If transported off-site for destruction, the UXO will be transported by either military vehicles or by a qualified UXO contractor. The UXO is typically transported to an active military installation where it can be safely destroyed.

b. Safety. The following safety considerations for UXO destruction should be addressed in the Work Plan.

(1) The UXO team conducting destruction activities will have at least three personnel with a minimum of two UXO qualified personnel: one UXO Technician III and one UXO Technician II. One member of the UXO team must always be located outside the minimum separation distance for intentional detonations to give warning and assist in rescue activities in the event of an accident.

(2) Explosives or accessory equipment that is obviously deteriorated or damaged will not be used.

(3) Blasting caps will be at least a commercial No. 8 or equivalent and, for destruction activities requiring multiple caps, be from the same manufacturer.

(4) Blasting caps must be transported in approved containers and not exposed to direct sunlight.

(5) The explosive end of blasting caps, detonators, and explosive devices will be pointed away from the body during handling.

(6) Blasting caps will not be buried. Detonating cord will be used to position blasting caps above the ground.

(7) Electric blasting caps must be tested for continuity prior to connecting them to the firing circuit. Upon completion of testing, the lead wires will be short-circuited by twisting the bare ends of the wires together.

(8) In the event of an electric misfire or non-detonation, the UXO destruction site must not be approached for at least 30 minutes. The wait time for nonelectric procedures will be 60 minutes plus the burn time for the fuse. A post-search of the detonation site must be conducted to ensure complete UXO destruction and to ensure that no fires have started.

c. Transport.

(1) Existing site conditions may require that UXO that has been certified as safe-to-ship in accordance with Technical Bulletin (TB) 700-2, DOD Ammunition and Explosives Hazard Classification Procedures be transported to a designated UXO destruction location either on or off the project site.

(2) A Transportation Plan detailing the route and procedures to be used during the transportation of the UXO must be prepared and accepted prior to engaging in any transport activities to ensure that all safety aspects of the movement have been addressed. The transport of UXO off-site must be performed in accordance with the provisions of 49 CFR Part 172; DA Pamphlet (DA Pam) 385-64, Ammunition and Explosives Safety Standards; and applicable state and local laws. Contractor personnel who, by contract requirement, are tasked with the responsibility of transporting or preparing shipments of OE over public roads must meet all training requirements of 49 CFR Part 172 and applicable state requirements.

(3) Safety. UXO items should only be transported from the discovery location to an alternate destruction location as a last option. Armed fuzes must only be transported when absolutely necessary and when all other avenues for in-place disposal have been exhausted. Safety considerations for the transport of UXO include the following:

(a) UXO packaging designs must provide an appropriate container with appropriate blocking and bracing to prevent migration of the hazardous filler. Padding should also be added to protect any exposed filler from heat, shock, and friction.

(b) Base-ejection type projectiles must be transported with the base oriented to the rear of the vehicle and the projectile secured.

(c) Incendiary loaded munitions should be placed on a bed of sand and covered with sand.

(d) Loose pyrotechnic, tracer, flare, and similar mixtures should be placed in #10 mineral oil or equivalent.

(e) White phosphorus filled munitions should be immersed in water, mud, or wet sand.

(4) Manifest. A Hazardous Waste Manifest (Environmental Protection Agency [EPA] Form 8700-22) is required when transporting OE over public roads in non-emergency situations. In emergency situations, military EOD will respond. For informational guidance on the Hazardous Waste Manifest, refer to 49 CFR 172.205 and 40 CFR 262.20. For the purposes of transportation and storage, OE will be hazard classified in accordance with TB 700-2. Government personnel who are tasked to sign shipping papers (including the Hazardous Waste Manifest, if required), must be trained and be given signature authority by their agency in accordance with the requirements of DOD 4500.9-R, Defense Transportation Regulation, Part II, Cargo Movement.

d. Explosives Management.

(1) Explosives used for the destruction of UXO must be acquired and managed in accordance with applicable federal, state, and local laws and regulations including, but not limited to, the following:

(a) Bureau of Alcohol, Tobacco, and Firearms Publication (ATF P) 5400.7, Alcohol, Tobacco, and Firearms Explosives Laws and Regulations, and 27 CFR.

(b) DOD 6055.9-STD.

(c) 49 CFR.

(d) 29 CFR 1910 and 1926.

(2) Acquisition. Explosives may only be purchased under a User of High Explosives License issued by the ATF. The license holder must provide written authorization designating the individuals authorized to purchase, store, or utilize explosives. This letter must specify the name, home address, date and place of birth, and the social security number of the designated individual(s). A copy of the letter must be maintained at the project office. In addition, the designated individual purchasing explosives may also be required to have a Blaster's License issued by the state in which the project is located. Explosives must be purchased from an ATF



licensed commercial distributor. The license holder must provide the distributor a certified statement of the intended use of the explosive material.

e. Temporary Explosives Storage Facilities on FUDS.

(1) When the contractor must establish temporary storage for explosives on FUDS, type 2 magazines conforming to the standards set forth in Section 55.206 of ATF P 5400.7 must be used. The location of the proposed magazines and the Q-D arcs must be shown on a site map attached to the ESP. The Q-D arcs must be based on the NEW established for each magazine and are derived using Table C9.T1, DOD 6055.9-STD. In the event that existing site conditions prohibit the siting of the magazines in conformance with derived Q-D arcs and the NEW cannot be reduced to achieve conformance, the PM must request assistance in the design of engineering controls or structural modifications necessary to bring the magazine within Q-D stated criteria.

(2) Explosives and initiators must be stored separately. If magazines are also used to temporarily store safe-to-ship UXO, each UXO item must be stored in accordance with its appropriate HD and the storage compatibility group criteria listed in Chapter 3, DOD 6055.9-STD. Each magazine must display the placards required by Department of Transportation (DOT) regulations 49 CFR Part 172, Subpart F for the HD of UXO or explosives stored in the magazine.

(3) Lightning protection is not required for magazines to be located on FUDS if all of the following criteria are met:

- (a) The magazine is constructed of 3/16-inch thick steel or greater.
- (b) The magazine is properly grounded.
- (c) The magazine is located at least 6.5 feet from the nearest fence.

f. Temporary Storage Facilities on Base Realignment and Closure (BRAC) Sites/Active Installations.

(1) Temporary storage facilities for projects on BRAC sites or active installations must be determined using the installation's criteria.

(2) Lightning protection for temporary storage facilities to be located on BRAC sites or active installations must meet the provisions of DOD 6055.9-STD.

g. Security.

(1) The Work Plan should describe the inventory control system to be implemented for explosives management. Magazine Data Cards documenting explosive transfers for each

magazine must be completed with a copy maintained within the associated magazine. Explosives issued and unexpended must be returned to the magazine at the end of each workday.

(2) The inventory control system must include provisions for the physical inventory of the stored UXO and explosives at least weekly. Actual quantities must be reconciled with the quantities annotated on the corresponding Magazine Data Cards. Any discrepancies must be immediately reported to the USACE representative and an audit initiated to determine the source of the discrepancy.

(3) A physical security survey should be conducted to determine if fencing or guards are required when temporary storage facilities must be established. Generally, a fence around the magazines is needed, but the contractor is responsible for determining the degree of protection required to deter the theft of UXO or explosives stored in the magazines.

(4) Locks used on magazines at a FUDS will meet the standards listed in Section 55.208 (a) (4), ATF P 5400.7. BRAC and Installation Restoration site requirements must be determined using the installation's service criteria. A key control system should be documented in the Work Plan.

h. Fire Prevention. A Fire Prevention Plan should be prepared and coordinated with the appropriate fire department with primary response responsibility. Fire extinguishers of an appropriate size and type must be located at all temporary explosives storage facilities.

i. Records. Records must be maintained for all transactions and expenditures of explosive materials for a period of five years from the date of transaction in compliance with ATF regulations. These records must be maintained at the project office during on-site operations and subsequently at the business office of the ATF license holder.

j. Debris/Remnant Management. The Work Plan must include operational and quality control procedures for the processing, demilitarization, and disposition of inert ordnance, target materials, and UXO-related remnants which fall within the classification of Ammunition, Explosives, and Dangerous Articles (AEDA). Contact the OE MCX for the requirements on AEDA processing and disposition.

#### 6-8. Quality Management.

##### a. Quality Control.

(1) The UXO team is responsible for the quality control (QC) of all surface and subsurface clearance activities and ensuring that only those procedures and processes conforming to contractual requirements and accepted project plans are implemented. The UXO team will develop a Quality Control Plan (QCP) outlining the quality activities to be used for continually assessing the implementation, effectiveness, compliance, and adequacy of operations.

(2) A separate UXOQCS is not required on-site full-time for UXO support activities. However, the UXO support contractor must perform QC reviews of all field activities in accordance with the accepted QCP.

(3) The QCP should provide procedures for validation of the following:

(a) Surface clearance and related activities are conducted in accordance with accepted project plans.

(b) Subsurface clearance and related activities are conducted in accordance with accepted project plans.

(c) Actual probabilities of detection are consistent with clearance reliability levels and USACE and DDESB requirements.

(d) Subsurface clearance operations provide for an adequate level of confidence of UXO detection and removal to specified depths.

(e) Disposition of UXO and materials classified as AEDA has been completed and documented. Procedures are available from the OE MCX.

b. Quality Assurance (QA).

(1) Districts should include UXO support capability in all applicable contracts for construction activities on FUDS or active military sites. UXO/OE concerns must be addressed before initiating any construction activities. Items developed for UXO support of construction activities (i.e., SOW, Work Plan, SSHP, ESP, and ESS, if required) must be submitted to the OE MCX for review and approval in accordance with the roles and responsibilities set forth in Chapter 1 of this pamphlet prior to initiation of on-site activities.

(2) The district is responsible for supervising the field work and ensuring contractor compliance with all accepted plans. The OE MCX may also conduct random inspections to verify conformance. Upon completion of the UXO support activities, the PM will ensure an After Action Report is submitted to the OE MCX.